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Taxonomy of two montane *Dichrorampha* species from the Balkans and Caucasus (Lepidoptera, Tortricidae)

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Abstract. *Dichrorampha pentheriana* (Rebel, 1917), previously known only from the type locality in Montenegro, is reported from the Vitosha Mountains in Bulgaria, at an altitude of 2100 m. Data on the habitat and the suspected larval host plant (*Achillea lingulata* Waldst. & Kit., Asteraceae) are provided. A new species, *Dichrorampha sakartvelana* sp. n., is described from the Georgian Great Caucasus Mountains, at altitude 2280 m. Male and female moths and their genitalia are illustrated with photographs and line drawings.

Introduction

The genus *Dichrorampha* Guenée, 1845 comprises 142 species as listed in the Online World Catalogue of the Tortricidae (Gilligan et al. 2014). Most known representatives occur in the Holarctic region, but this tendency may change; a plethora of new species from the Neotropics have been described during last few years (e.g., Razowski 2011, Razowski and Becker 2012). The complicated taxonomy of the genus is reflected in the extended synonymy (a total of 89 synonyms is listed in the Catalogue). Many *Dichrorampha* species have a limited distribution and may be restricted to particular mountain ranges, i.e. endemism is a common phenomenon within the genus, and one can expect larger numbers of undescribed relict and endemic taxa in high mountain massifs. In this context discovery of a new species from the vast Great Caucasus Mountains range was not surprising. More than 30 species are known from Caucasus (Danilevsky and Kuznetzov 1968, Esartiya 1988), 13 of them are endemics for this region. More unexpected was the discovery of *Dichrorampha pentheriana* (Rebel, 1917) in the vicinity of Sofia, in the small but relatively high (2290 m) Vitosha Mountains. Twenty-three *Dichrorampha* spp. are reported for Bulgaria, one of them (*D. rilana* Drenowsky, 1909) endemic for the highest Bulgarian mountains (including Vitosha).

The larvae of most *Dichrorampha* spp. feed on different Asteraceae, mainly two genera: *Achillea* and *Tanacetum* (Danilevsky and Kuznetzov 1968). They are internal feeders in root tissues.

Two nicely patterned female *Dichrorampha* were swept from *Achillea lingulata* Waldst. & Kit. (Asteraceae) in the summer of 2012 in Vitosha Mountains, Bulgaria. Dissection of the genitalia of the female did not provide a reliable identification; additional male specimens were needed but at the time of dissection the season was already over. Collecting of males was postponed to the year 2014, which unfortunately had a very cold and rainy summer; only a single worn female came from the three excursions. Eventually, in June 2015, two males as well as two females were swept from a mountain meadow with numerous flowering *A. lingulata*. The unmistakable genitalia of the

dissected male clearly demonstrated that this odd looking *Dichrorampha* is *D. pentheriana* (Rebel, 1917), until now known only from the type series.

An unknown *Dichrorampha* was discovered in 2014 during an entomological expedition in the Great Caucasus Mountains, Georgia. The two moths were captured in late afternoon flying around tufts of *Achillea* sp. growing on the rocks alongside a mountain road. Subsequent sweeping of the same (and other) *Achillea* species did not provide more material, and an approaching thunderstorm suspended any further efforts to collect additional specimens; the locality was not visited again. The specimens collected have identical wing patterns and are of similar size, which in combination with their synchrony and syntopy suggest that they are conspecific. The habitus, wing pattern and genital characters of both male and female moths show unquestionable affiliation to the genus *Dichrorampha*, but do not match any known species in this genus.

The purpose of the paper is to illustrate and provide additional data and a redescription for the little known *Dichrorampha pentheriana* and to describe *D. sakartvelana* sp. n.

Abbreviations of collections

BFUS	Zoological collection of Sofia University St. Kliment Ohridski, Faculty of Biology, Bulgaria
NHMW	Naturhistorisches Museum Wien, Austria
NMNHS	National Museum of Natural History Sofia, Bulgaria

Methods

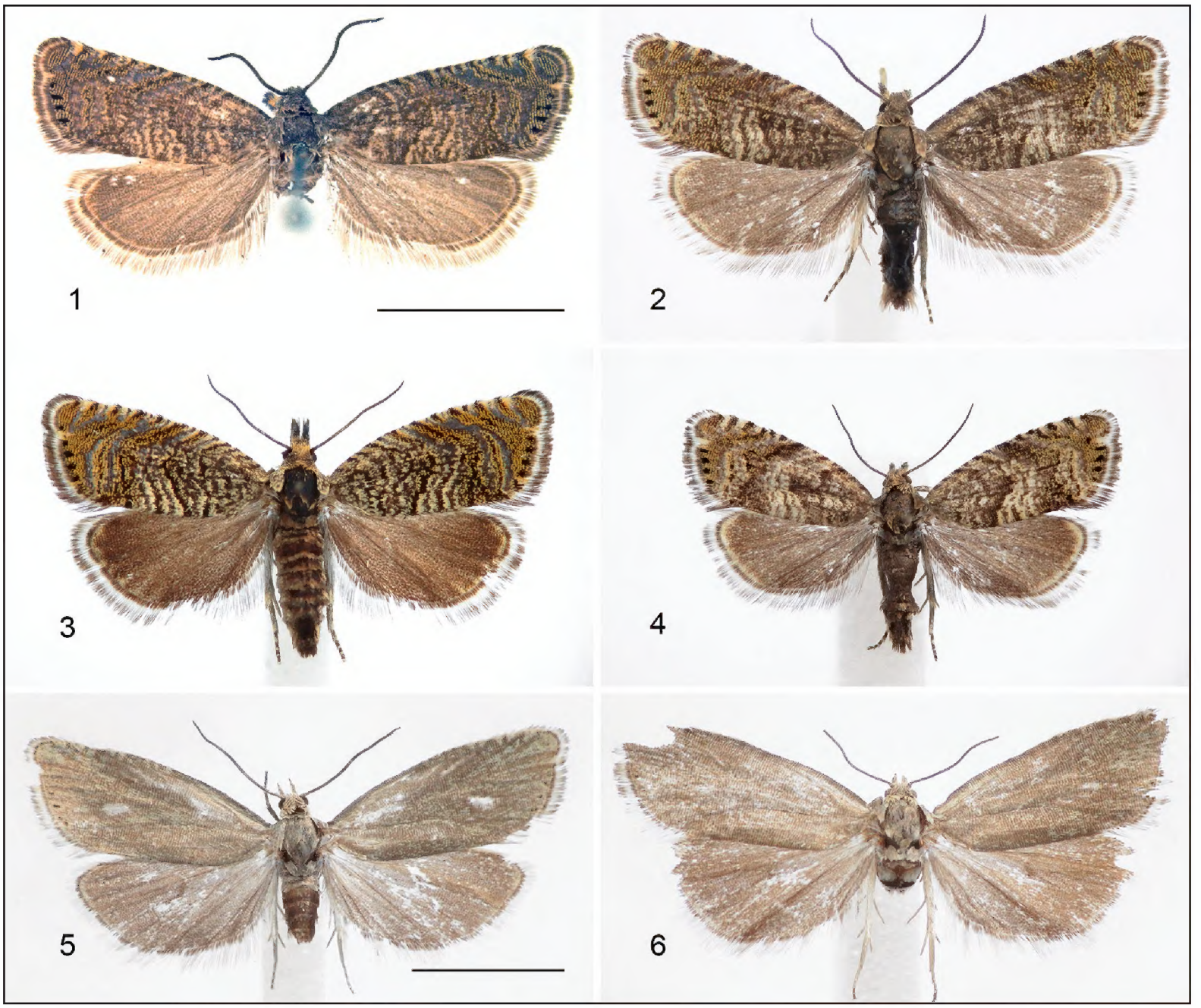
The moths were captured with aerial insect nets, killed with ethyl acetate and spread immediately. Later the abdomens were dissected and the genitalia were processed following the procedure of Robinson (1976). The type series of *D. pentheriana* was used for comparison with the Bulgarian specimens. The male paratype of *D. sakartvelana* was compared with male specimens of *D. petiverella* (Linnaeus, 1758) and *D. filipjevi* (Danilevsky, 1948). The nomenclature of the wing pattern follows mainly Baixeras (2002). The holotype of *D. sakartvelana* sp. n. will be deposited in BFUS, and the paratype in NMNHS. The *D. pentheriana* specimens are preserved in BFUS.

Dichrorampha pentheriana (Rebel, 1917)

Figs 1–4, 7–10, 14

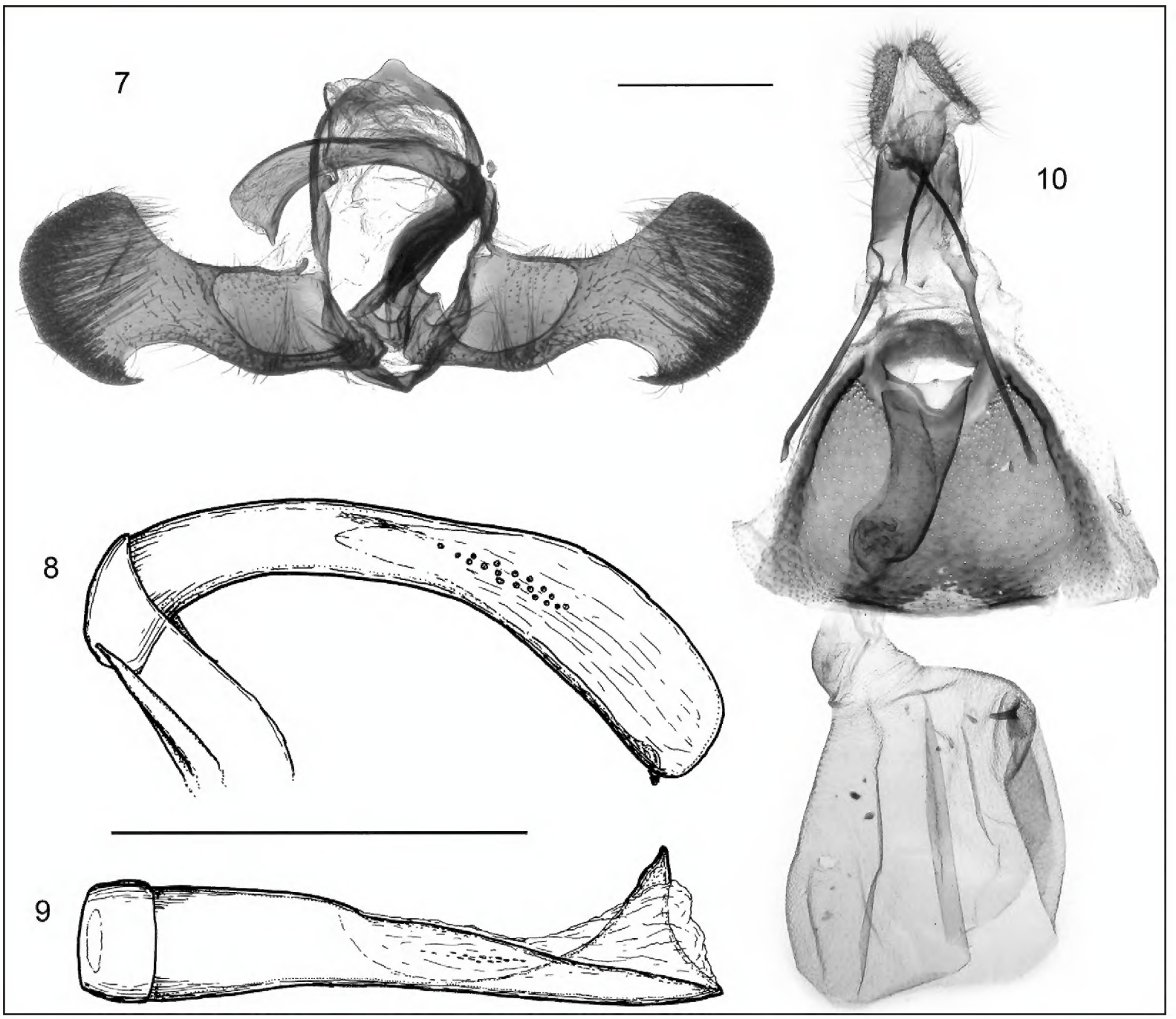
Material. 2 ♂, Bulgaria, Vitosha Mts, near Cherni vrah chalet, 2100 m a.s.l., N 42°34'20" E 23°17'03", 11.vii.2015, leg. B. Zlatkov & E. Tasheva, coll. BFUS; 2 ♀, ibid.; 2 ♀, ibid. but 13.vii.2012, leg. B. Zlatkov & D. Gradinarov; 1 ♀, ibid. but 25.vii.2013, leg. B. Zlatkov.

Redescription based on the Bulgarian specimens (Figs 2–4). Sexual dimorphism subtle. Head: Frons and vertex pale brown, palpus labialis yellow encircled with black scales. Antennae with beige scales. Thorax: Upperside, including patagia and tegulae, grey-brown, in some specimens scales with beige tips. Underside anterior pale grey, posterior and legs dark grey. Forewing length male 6.7–6.8 mm, female 5.7–6.5 mm, wingspan in set specimens 12.0–14.5 mm. Forewings moderately wide, without costal fold in males, with slightly convex costal edge (more convex in females than in males). Upperside wing pattern contrast, especially in females (Figs 3, 4),



Figures 1–6. *Dichrorampha* spp. **1–4**, *D. pentheriana* (Rebel, 1917): **1.** lectotype ♂, Montenegro, Zljeb Mts, 23.vi.1916, coll. NHMW (courtesy of NHMW); **2.** ♂, Bulgaria, Vitosha Mts, 11.vii.2015, coll. BZ; **3.** ♀, the same data but 13.vii.2012; **4.** ♀, the same data but 11.vii.2015; **5–6**, *D. sakartvelana* sp. n.: **5.** paratype ♂, Georgia, Great Caucasus Mts, 27.vii.2014, coll. NMNHS; **6.** holotype ♀, ibid. Figures **1–4** and **5–6** are proportional. Scale bar: 5 mm.

consisting of numerous pale and dark transverse lines. Nine pairs of creamy distinct costal strigulae. Lead refractive transversal lines (striae) emerge from pairs 3–7; line of pair 3 ill-defined and pronounced only in some specimens; line of pair 4 reaching the discal cell; lines of pairs 5 and 6 initially merged then divided forming the refractive lines of the speculum; line of pair 7 short, dot-like; lines of pairs 8 and 9 relatively short, convergent and connected with creamy terminal ("postapical") strigulae. All pattern elements from the wing base to the median fascia consist of black and beige ill-defined lines, forming a vestigial dorsal patch in the region of the interfascial area basad to the median fascia. Median fascia darker, with black and golden-tipped scales; these scales predominate in the distal wing pattern. Four black terminal dots are present in most specimens; in some an additional dot above the terminal strigula is present. Forewing underside beige-grey, with distinct costal and terminal strigulae and terminal dots corresponding to the same upperside elements. Cilia grey-brown with pale median line. Hindwings upperside monochrome



Figures 7–10. Genitalia of *Dichrorampha pentheriana* (Rebel, 1917). **7.** Male genitalia photographed under coverslip, specimen Vitosha Mts, 11.vii.2015; **8–9**, phallus drawn without coverslip in left (**8**) and dorsal (**9**) view. **10.** Female genitalia, specimen Vitosha Mts, 13.vii.2012. Figures 7 and 10 are to the same scale. Scale bar: 0.5 mm.

grey-brown with beige terminal line. Underside pale grey with paler terminal line. Cilia paler than those of the forewing. Abdomen dark grey.

Male genitalia (Figs 7–9): In agreement with the preparation of the genitalia of the lectotype as well as the description by Razowski (1971). The shape of valva and phallus depends on the pressure of the coverslip. For example, the cavity at the proximal part of cucullus looks deeper or shallower depending on the pressure applied. The same is valid for the phallus: the large triangular terminal process in natural condition is pointed laterally at right (Figs 8, 9), but under a coverslip it is ventrally oriented (Fig. 7).

Female genitalia (Fig. 10): In agreement with the preparation of the genitalia of the female paralectotype and the description by Razowski (1971).

Diagnosis. The wing pattern of *D. pentheriana* resembles that of *D. distinctana* (Herrich-Schäffer, 1851) but is easily distinguished by lacking the costal fold. The male genitalia are

distinctive and do not show obvious affinities to other species of the genus. The shape of the valva is relatively similar to those of some forms of *D. plumbana* (Scopoli, 1763), but the phallus is strikingly different. The female genitalia are less characteristic, with antrum (sclerotised posterior part of ductus bursae) similar to some extent to those of *D. bugnionana* (Duponchel, 1843).

Biology. The species is on the wing from mid June to late July. The larval host plant in all likelihood is *Achillea lingulata* Waldst. & Kit., considering the fact that many *Dichrorampha* feed on *Achillea* and all specimens were swept during the florescence period of *A. lingulata* from its stems or surrounding grass vegetation. Other *Achillea* spp. and also other Asteraceae growing in the vicinity were searched for *D. pentheriana* without a positive result, so *D. pentheriana* is likely to be monophagous. The habitat is a subalpine meadow at an altitude of ca. 2000 m (Fig. 14).

Distribution. Zljeb Massif (part of Prokletije Mts, between Montenegro and Serbia) and Vitosha Mts (Bulgaria).

Remarks. Rebel (1917) described *D. pentheriana* from three specimens (2 males, 1 female) collected in Zljeb Mountains, Montenegro, at an elevation of 1700 m, preserved in NHMW. Obraztsov (1953) did not examine the type series and erroneously claimed that it consists of only two males. Danilevsky and Kuznetzov (1968) also did not examine the specimens and similarly gave wrong information about the specimens of the type series: three males and one female. Razowski (1971) dissected a male and female syntype, designated the male as lectotype, and provided descriptions and illustrations of male and female genitalia for the first time. The subtle differences in the genitalia of the Bulgarian specimens compared to those of the type series are likely due to normal variation and/or deformation by pressure of the coverslip.

No colour illustrations of the adult can be found in literature with the exception of those in Razowski (2003) (paralectotype male; the photograph is apparently altered digitally and shows some differences with the original appearance of the specimen). The lectotype (Fig. 1) is illustrated here for comparison with some of the Bulgarian specimens. As seen in the figure, the moths from Vitosha demonstrate two differences with the types: a more contrasting forewing pattern, especially in females and the presence of pale terminal line on the hindwings.

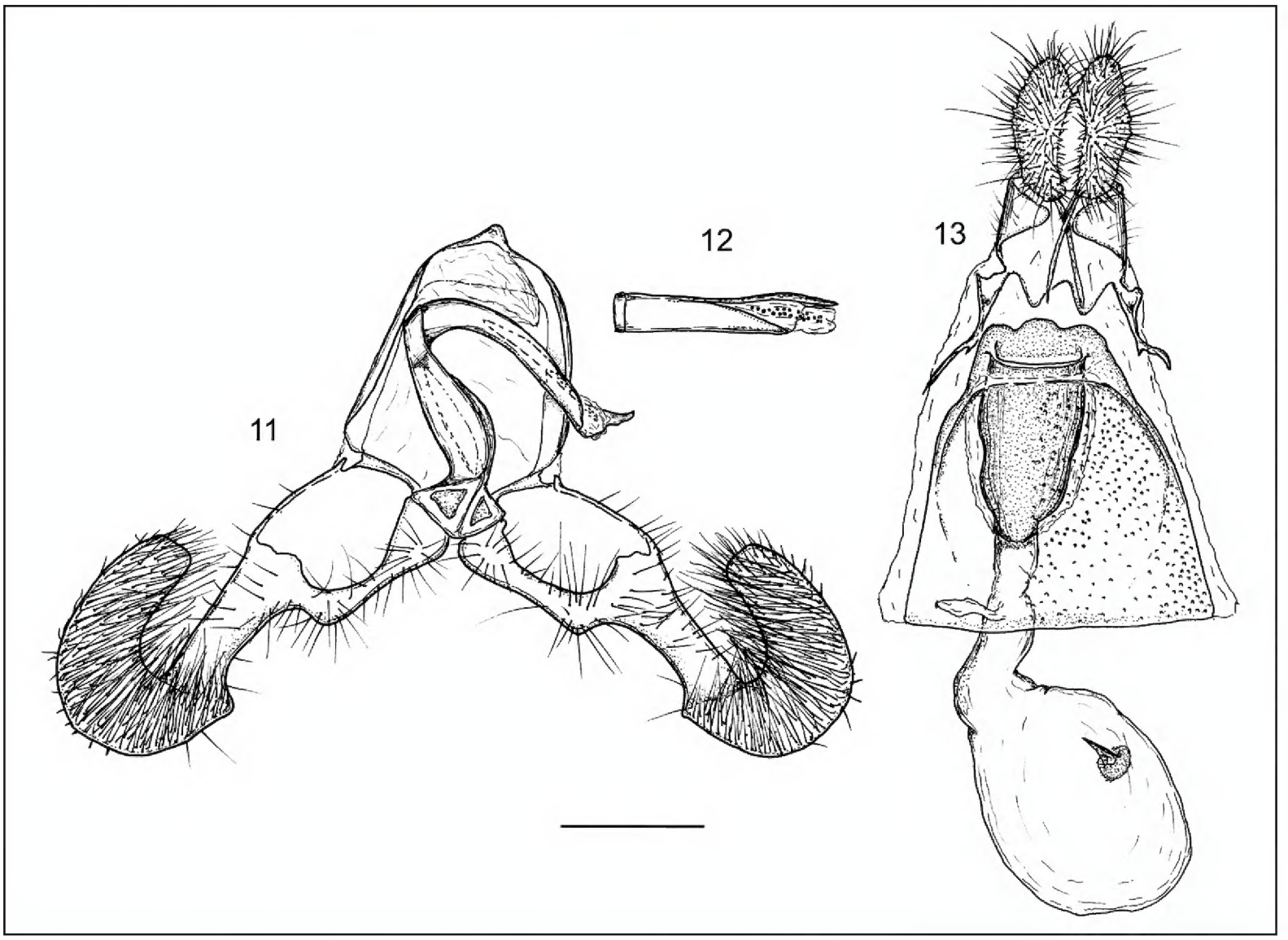
Dichrorampha sakartvelana sp. n.

http://zoobank.org/1919B149-1E92-49DA-90BB-4E1689F9C42D

Figs 5–6, 11–13, 15

Material. Holotype ♀, with three labels: "Georgia, Great Caucasus | Mountains, Caucasus Range, | near Abano pass | 2280 m N 42°15'54" E 45°30'17" | 27.vii.2014, netting | leg. B. Zlatkov", "Holotypus ♀ | *Dichrorampha* | *sakartvelana* | det. B. Zlatkov 2015 [red label]", "BFUS | ♀ | Genitalia slide | No. 27.vii.2014/1", BFUS. – Paratype ♂, with three labels: the first as in Holotype; the other two: "Paratypus ♂ | *Dichrorampha* | *sakartvelana* | det. B. Zlatkov 2015 [red label]", "NMNHS | ♂ | Genitalia slide | No. 27.vii.2014/2", NMNHS.

Description. Adult (Figs 5–6). Sexual dimorphism subtle. Head: Frons and vertex covered with brown-grey scales. Palpus labialis with whitish basal and brown-grey distal segment; the second segment with whitish base and brown tuft at the distal end. Antennae covered with dark grey scales. Thorax: Nota, patagia and tegulae uniformly grey, thorax underside (including coxae) whitish, legs brown. Forewings comparatively wide, in male with costal fold with 1/5 of the length of the costal edge. Forewing length male 8.65, female 8.90 mm, wingspan in set specimens



Figures 11–13. Genitalia of *Dichrorampha sakartvelana* sp. n. **11.** Male genitalia, paratype; **12.** Phallus, dorsal view, paratype; **13.** Female genitalia, holotype. Scale bar: 0.5 mm.

18.5–19 mm. The specimens are worn, but preserved areas on the forewing upperside have pale greenish-grey overlaying scales which apparently do not form an obvious pattern. No markings are visible with the exception of five pairs of faint distal costal strigulae (pairs 5–9 sensu Baixeras, 2002). Three black terminal dots are present. Underside uniformly brown. Cilia creamy with pale brown margin. Hindwings with pale brown upperside and whitish underside. Cilia whitish. Abdomen covered with pale grey scales.

Male genitalia (Figs 11–12): Tegumen bearing a small lobe as uncus. Valva broad basally with wide basal cavity. Costal edge slightly convex. Sacculus nearly parallel to costal edge, indistinctly concave, ending with nearly straight angle. Ventral incision elongated, trapezoidal. Neck of valva slender, more than two times narrower than the basal part of valva and relatively long, 3/4 of its length. Cucullus with large dorsal lobe, densely covered with long setae, and a small rectangular ventral prominence. Phallus slender, ca. 3/5 of the length of valva, bent ventrally in the basal part, with membranous area extending at first on right, then on dorsal side. A large triangular prominence pointed dorsally at the right side of the tip is present. Circa 20 sockets of deciduous cornuti are counted.

Figures 14–15. Habitats. **14.** Habitat of *Dichrorampha pentheriana* (Rebel, 1917), Vitosha Mts, 13.vii.2012, foreground: the suspected larval host plant *Achillea lingulata* (photo: D. Gradinarov); **15.** Habitat of *D. sakartvelana* sp. n., Great Caucasus Mts, Tusheti Range, 27.vii.2014 (photo: M. Ilieva).

Female genitalia (Fig. 13): Papillae anales wide. Apophyses posteriores equal in length to the apophyses anteriores, the latter look naturally deformed. Sterigma sclerotised, slightly asymmetrical, trapezoidal, with two incisions on the posterior margin of the postostial part. Ostium wide. Subgenital plate trapezoidal with distinctly sclerotised lateroposterior margins and rounded posterior angles. Antrum with the length of the membranous part of ductus bursae, well sclerotised, remarkably wide, nearly symmetrical, wineglass shaped and enveloped in a thin cuticular membrane visible after staining. The proximal sclerotisation of ductus bursae is barely discernible only under higher magnification. Ductus seminalis emerging at the middle of the membranous ductus bursae. Corpus bursae ovoid. A single moderately sized signum is present.

Diagnosis. The new species is characterized externally by uniformly coloured forewings (though the specimens are not fresh) and large size. The male genitalia resemble some species of the "section petiverellae" (sensu Danilevsky and Kuznetzov 1968), which apparently are closely related to *D. sakartvelana* sp. n. *D. flavidorsana* Knaggs, 1867 and *D. filipjevi* (Danilevsky, 1948) have similarly shaped valva, but the apical prominence of the phallus is pointed ventrally, and the ventral process of the cucullus is much larger in *D. filipjevi*. *D. petiverella* (Linnaeus, 1758) and *D. proxima* (Danilevsky, 1948) are also similar in general, but they have two distinct processes of the cucullus. Female genitalia do not demonstrate clear affinities to any Palaearctic *Dichrorampha*.

Preimaginal stages. Unknown.

Biology. The moths were collected at the end of July, but their condition presumes that they are on the wing earlier. The larval host plant is most probably *Achillea* sp. above which the moths were flying (plant material was not preserved and an exact identification is thus not possible). The habitat (Fig. 15) is a subalpine meadow at an elevation of ca. 2300 m with denuded rocks where the host plant grows.

Distribution. Known from the type locality only.

Etymology. The name of the species is an adjective, derived from the autonym for Georgia, *Sakartvelo*, and the specific ending for Tortricidae *-ana*.

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